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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/626,583
Filing Date: July 25, 2003
Appellant(s): SIBBESEN ET AL.

Michele M. Simkin
Registration No. 34,717
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 05/27/09 appealing from the Office action mailed 10/20/08 (ADVISORY ACTION).

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeal and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The statement of the status of claims contained in the brief is correct.

(6) Grounds of Rejection to be reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

For the purpose of this appeal, the claims on appeal shall stand or fall together.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

5,176,927	**Haarasilta et al.**	**01-1993**
5,405,769	**Campbell et al.**	**04-1995**

Poutanen K., "Enzymes: An important tool in improvement of the quality of cereal products". Trends in Food Sci. & Technol.,1997, Vol. 8: 300-306.

Paice et al., (Accession No. P18429, UniProt Database, 1990) and Paice et al., "A xylanase gene from *Bacillus subtilis*: nucleotide sequence and comparison with *B.pumilus* gene". Arch. Microbiol., 1986, Vol. 144: 201-206.

Wolf et al., (Accession No.: I40569, PIR database, 1996) and Wolf et al., "Genes encoding xylan and β-glucan hydrolyzing enzymes in *Bacillus subtilis*: characterization, mapping and construction of strains deficient in lichenase, cellulase and xylanase". Microbiology, 1995, Vol. 41: 281-290.

Autio et al., "Effects of purified endo-β-xylanase and endo-β-glucanase on the structural and baking characteristics of rye doughs. Academic Press, 1996, pages 18-27.

(9) Grounds of Rejection

Claims 56-66, 69 and 70 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haarasilta et al., (U.S. Patent No.: 5,176,927, date of patent 06/05/1993) or Poutanen K (1997) in view of Paice et al., (Accession No.: P18429, UniProt Database, 1990 and Arch. Microbiol. 1986, Vol. 144: 201-206 cited in IDS) or Wolf et al., (Accession No.: I40569, PIR database, 1996 and Microbiology, 1995, Vol. 41: 281-290, cited in IDS) and Campbell et al., (U.S. Patent No.: 5,405,769, date of patent 04/11/1995).

Haarasilta et al., disclose baking products comprising yeast and use of xylanases in said baking products and methods for determining the softness and stickiness of

doughs comprising xylanases and yeast including altering the liquid requirement ratio (flour *vs.* liquid). Said reference teaches that: a) it is preferable to use less liquid as it cuts the cost of production of bread by lowering the time required for baking and one of the accepted methods in the baking industry is the addition of cellulolytic and hemicellulolytic enzymes such as xylanase to cleave non-starch polysaccharides present in flour which improves the properties of baking process and the finished baking product; b) as addition of cellulolytic and hemicellulolytic enzymes (xylanases) makes the dough softer, so less dough liquid is required as compared with conventional techniques; and c) the reduced concentration of water requires less energy than prior art methods and in large scale baking processes, this improved efficiency will result in substantial cost savings (columns 2, lines 32-34; column 3, lines 40-66; columns 4-6, column 11, line 37-50).

Poutanen K also teach use of xylanases in baking, baking products and doughs and the mechanism of action of added enzymes in baking products such as improved dough handling properties and specifically: a) effect of addition of xylanases to said baking products resulting in improved product quality (column 2, page 302; column 2, page 303 and Fig. 1); b) addition of xylanase was effective in increasing the specific volume of wheat bread without causing stickiness (Table 3, page 304); c) use of xylanase would cause water redistribution from pentosans to gluten phase, facilitating extensibility and resulting in better ovenspring (column 1, page 304); and d) xylanases have been employed to control the viscous and water binding properties in baking products for retaining a tender, non-brittle and shelf-stable structure (column 2, page 304).

However, Haarasilta et al., or Poutanen K are silent regarding using xylanase in said baking products and said xylanase having the amino acid sequence of SEQ ID NO: 5 and encoded by a polynucleotide sequence of SEQ ID NO: 6 or wherein said xylanase having the amino acid sequence of amino acid residues 29-213 of SEQ ID NO: 5 lacking the leader sequence.

Paice et al., or Wolf et al., teach the isolation of a polynucleotide and encoding polypeptide from a *Bacillus subtilis* strain having 100% sequence identity to SEQ ID NO: 6 of the instant application and the encoded polypeptide has 100% sequence identity to SEQ ID NO: 5 and having xylanase activity.

Similarly, Campbell et al., teach the isolation of a *Bacillus* xylanase having 100% sequence identity to the amino acid sequence of amino acid residues 29-213 of SEQ ID NO: 5 lacking the leader sequence (SEQ ID NO: 37; columns 219 and 220) and also suggest the use of said xylanase for altering the texture in bakery products (column 1).

It would have been obvious to a person of ordinary skill in the art to use the xylanases of Paice et al., or Wolf et al., and Campbell et al., in baking, baking products and doughs as suggested by Haarasilta et al., or Poutanen K. Motivation to do so derives from the fact that addition of xylanases to said baking products results in improved product quality and specifically mention that addition of xylanase was effective in increasing the specific volume of wheat bread without causing stickiness. The expectation of success is high, because Paice et al., or Wolf et al., and Campbell et al., teach the isolation of xylanases including xylanases lacking the leader sequence with desirable properties and having 100% sequence identity to SEQ ID NO: 5 of the instant

application and Haarasilta et al., or Poutanen K disclose the advantages of addition of xylanases in baking, baking products and doughs. Therefore, claims 56-66 and 68-70 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haarasilta et al., (U.S. Patent No.: 5,176,927, date of patent 06/05/1993) or Poutanen K (1997) in view of Paice et al., (Accession No.: P18429, UniProt Database, 1990 and Arch. Microbiol. 1986, Vol. 144: 201-206 cited in IDS) or Wolf et al., (Accession No.: I40569, PIR database, 1996 and Microbiology, 1995, Vol. 41: 281-290, cited in IDS) and Campbell et al., (U.S. Patent No.: 5,405,769, date of patent 04/11/1995).

Claim 67 is rejected under 35 U.S.C. 103(a) as being unpatentable over Haarasilta et al., (U.S. Patent No.: 5,176,927, date of patent 06/05/1993) or Poutanen K (1997), Paice et al., (1986) or Wolf et al., (Accession No.: I40569, PIR database, 1996 and Microbiology, 1995, Vol. 41: 281-290, cited in IDS), Campbell et al., (U.S. Patent No.: 5,405,769, date of patent 04/11/1995) and further in view of Autio et al., (Academic Press, 1996, pages 18-27).

The combination of Haarasilta et al., or Poutanen K, Paice et al., or Wolf et al., and Campbell et al., is described above. Although, said combination teaches the isolation and addition of purified xylanase to bakery products, doughs and in baking, said combination does not explicitly teach xylanase free of glucanase enzymes. Autio et al., teach the effects of purified xylanase and glucanase on the structural and baking characteristics of doughs, said reference discloses that addition of glucanase had a hardening effect on doughs and bakery products (column 1, page 21 and Table 3, page 22). It would have been obvious to a person of ordinary skill in the art to combine the

teachings of Haarasilta et al., or Poutanen K, Paice et al., or Wolf et al., Campbell et al., and Autio et al., to adopt the enzymatic reaction conditions for baking products and doughs comprising the xylanase enzyme to be devoid of glucanase as presence of glucanases catalyzes the breakdown of substrates that results in unwanted hardening effect on said products. Therefore, Claim 67 is rejected under 35 U.S.C. 103(a) as being unpatentable over Haarasilta et al., (U.S. Patent No.: 5,176,927, date of patent 06/05/1993) or Poutanen K (1997), Paice et al., (1986) or Wolf et al., (Accession No.: I40569, PIR database, 1996 and Microbiology, 1995, Vol. 41: 281-290, cited in IDS) and Campbell et al., (U.S. Patent No.: 5,405,769, date of patent 04/11/1995) and further in view of Autio et al., (Academic Press, 1996, pages 18-27).

Therefore, the above references render claims 56-67, 69 and 70 *prima facie* obvious to one of ordinary skill in the art.

(10) Response to Argument

In support of their request that said rejection be withdrawn, Appellants provide the following arguments:

(1) The examiner relies upon Haarasilta and Poutanen as the primary reference in the present rejection. Haarasilta discloses the use of xylanases generally in baking products. However, Haarasilta does not teach or suggest the use of bacterial xylanase as is presently claimed. Poutanen discusses that the use of xylanases generally increases viscosity, results in better “ovenspring”, increases bread volume, and decreasing staling. Poutanen is silent with regard to the effect of a bacterial xylanase, as is presently claimed, may have on stickiness of dough (page 9 of Appeal brief).

(2) At the time of the claimed invention, bacterial xylanases were known to produce very sticky doughs. Additionally, references such as Maat et al., (Xylanases and their application in bakery", in Xylans and Xylanases ed. J. Viser et al., Elsevier: 349-360 (1992) ("Maat") (cited by Poutanen and cited as document A27 in the IDS filed 08/18/2003) disclose that xylanases derived from fungal sources other than *Aspergillus awamori* and bacterial sources result in sticky dough (page 9 of Appeal brief).

(3) Examiner relies upon Paice or Wolf as allegedly describing a polynucleotide and polypeptide encoded by the polynucleotide having 100% sequence homology to the nucleotide sequence of SEQ ID NO: 6 and the polypeptide of SEQ ID NO: 5. Neither Paice nor Wolf disclose or suggest a bakery product or a dough for making a bakery product.

The examiner also cites Campbell as allegedly describing a *Bacillus* xylanase having 100% sequence identity to the amino acid sequence of amino acid residues 29-213 of SEQ ID NO: 5 (SEQ ID NO: 37 of Campbell) and also suggests the use of said xylanase for altering the texture in bakery products (column 1). Campbell makes a reference to a bakery use for xylanases in general in the background. Thus, Campbell teaches modified xylanases based on naturally occurring xylanases with a vague reference to their use in food processing (pages 10-11 of Appeal brief).

(4) Appellants emphasize that one of skill in the art would not have been able to predict the effects on dough stickiness of a bacterial xylanase which is expressed from the nucleotide sequence of SEQ ID NO: 6. Indeed, one of skill in the art would have predicted that a bacterial xylanase would have a *negative* impact based on dough

stickiness **based on the teaching of Maat**, for example. Furthermore, it was unexpected, and thus unpredictable, that xylanase expressed from the nucleotide sequence of SEQ ID NO: 6 would have resulted in decreased dough stickiness. Thus, the present invention is not a combination of prior art elements according to known method to yield predictable results (pages 11-12 of Appeal brief).

Reply (1)-(4): Appellants' arguments have been considered but are found to be non-persuasive for the following reasons:

Appellants' arguments are directed against the references individually. However, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

The cited references are in congruence with the obviousness rejection and teach all limitations of the instant claims i. e., meet all the criteria and parameters (Teaching, Suggestion and Motivation) as defined by *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966) and the rationale for TSM test (Teaching, Suggestion and Motivation) according to the KSR ruling.

Moreover, the objectives of the cited references need not be the same as the instant invention to be used in an Obviousness rejection. So long as the motivation or suggestion to combine the teaching of the cited references is known or disclosed in the prior art and is obvious to one skilled in the art. This is sufficient to establish a *prima facie* case of obviousness.

Examiner would like to reiterate the siginificant teachings of the cited prior on which the rejection is based.

(A) Haarasilta et al., teaches that xylanase activity represents hemicellulolytic activity (column 5, lines 36-39) selectively hydrolyzing xylans, this hydrolysis imparts the desirable quality in a bakery product.

(B) Paice et al., (Arch. Microbiol. 1986, Vol. 144: 201-206) teaches that xylanases differ in their activities i.e., the xylanase isolated by Paice et al., that has 100% sequence identity to SEQ ID NO: 5 of the instant application is an endoxylanase and the primary activity of the cloned enzyme is hydrolysis of xylans and not cellulose (column 1, page 201; column 1, page 205 and entire document) and xylanases are used as an industrial catalyst (various industrial applications) and suggest that it would be advantageous to produce cellulase free xylanase and to recombinantly express said enzyme in a non-cellullolytic organism (cellular context) as the presence of other enzymes results in undesirable outcome depending on the intended use of said xylanase as a catalyst. This suggestion by Paice et al., taken together with the teachings of prior art, Poutanen K (Trends in Food Sci. & Technol.,1997, Vol. 8: 300-306) that teaches use of xylanases in baking, baking products and doughs and the mechanism of action of added enzymes in baking products such as improved dough handling properties and specifically: a) effect of addition of xylanases to said baking products resulting in improved product quality (column 2, page 302; column 2, page 303 and Fig. 1); b) addition of xylanase was effective in increasing the specific volume of wheat bread without causing stickiness (Table 3, page 304); c) use of xylanase would

cause water redistribution from pentosans to gluten phase, facilitating extensibility and resulting in better ovenspring (column 1, page 304); and d) xylanases have been employed to control the viscous and water binding properties in baking products for retaining a tender, non-brittle and shelf-stable structure (column 2, page 304). Poutanen K further state that in an attempt to understand the sequential reactions such as effect of enzymes on doughs and baking products in altering the molecular properties, microstructure, functional properties and product quality, several reports are directed to studying the mechanism of action of xylanases. Xylanases release high molecular weight water-soluble arabino-xylans from water-unextractable cell wall material. The specific viscosities of extracts from xylanase-treated doughs were 40-65% higher than those extracts from untreated dough, because the average apparent viscosity of the extracted arabino-xylans remained high. Thus it becomes clear to one of skill in the art that xylanases with desirable specific activities determine the effect of enzymes on doughs and baking products in altering the molecular properties, microstructure, functional properties and product quality and a skilled artisan would employ a xylanase with the desired activity. Therefore, a skilled artisan will be motivated to use highly purified, especially recombinant xylanase free of other enzymes as it is advantageous to selectively breakdown xylans without affecting the cellulose content in a bakery product to achieve desirable qualities.

(C) Campbell et al., (U.S. Patent No.: 5,405,769, date of patent 04/11/1995) teach the isolation of a *Bacillus* xylanase having 100% sequence identity to the amino acid sequence of amino acid residues 29-213 of SEQ ID NO: 5 lacking the leader

sequence (SEQ ID NO: 37; columns 219 and 220) and also suggest the use of said recombinant xylanase for altering the texture in bakery products (column 1).

Therefore, the combination of references of Haarasilta et al., Poutanen K, Paice et al., Wolf et al., and Campbell et al., teach the functional and structural elements of the instant invention; a purified xylanase free of other contaminating enzymes, specifically an endoxylanase and the primary activity of the cloned enzyme is hydrolysis of xylans and selective breakdown of xylans is desirable to achieve the necessary qualities in a bakery product.

Appellants further argue:

(5) The present invention cannot be considered "Obvious to try", indeed there were a vast number of xylanases from many different organisms, a quick search of NCBI database revealed publication of 494 sequences at the time of the instant invention, one of skill in the art could have chosen any one of these xylanases. The examiner has provided no motivation as to why one of skill in the art would have used the specifically claimed bacterial xylanase, since it was known in the art that bacterial xylanases were known to produce very sticky doughs. Specification at paragraphs [0010]-[0012] and **Maat.** Relying upon impermissible hindsight, the examiner has arrived at the xylanase disclosed in Paice, Wolf and Campbell based upon sequence comparison from Appellants' disclosure. Appellants maintain that the examiner relies upon impermissible hindsight to create the rejection. Thus, the present invention cannot be obvious (pages 12-14 of Appeal brief).

Reply (5): In response to appellants' argument that the examiner's conclusion of

obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the appellants' disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Examiner has endeavored in his reply (1)-(4) above to establish that the cited references are in congruence with the obviousness rejection and teach all limitations of the instant claims i. e., meet all the criteria and parameters (Teaching, Suggestion and Motivation) as defined by *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966) and the rationale for TSM test (Teaching, Suggestion and Motivation) according to KSR ruling.

Furthermore, the Appellants have based their arguments on the teachings of Maat et al., and allege that examiner has discounted said reference as it teaches away from the instant invention i.e., use of bacterial xylanase in doughs and bakery products.

Examiner takes the position that Appellants have cited a very "select" portion of the Maat reference, page 349, paragraph 2, to support their argument. Contrary to Appellants' arguments, if one looks at the Maat reference in its entirety, the reference emphasizes the use of highly purified recombinant xylanase irrespective of the source; specifically page 350, paragraph 2 recites "The commercial enzyme preparations combine several enzyme activities, and vary considerably in composition and ratio of

activities, depending on the source. In order to better control the effect of enzymes with respect to above mentioned process and product criteria we have embarked on the analysis of fungal enzyme preparations. This has eventually resulted in the identification of a xylanase as a very important contributor to improved bread volume and design of a production route of a specific xylanase, involving recombinant DNA procedures".

Therefore, in fact Maat et al., and the cited prior art supports the Office position and does not teach away from the use of bacterial xylanase. Maat et al., used specific fungal xylanase in their studies as said organism was a high producer of the desired xylanase as compared to other xylanases (paragraph 1, page 355) and therefore the interpretation by the Appellants that Maat et al., teaches away from the use of bacterial xylanase is **not agreed.** In fact, the xylanase isolated by Maat et al., had **considerable homology to bacterial xylanases** (page 357). Maat concludes that "Moreover, the xylanase enzyme described here had a good effect on the crumb structure and gave rise to little or no dough stickiness contrary to preparations of *Trichoderma viridi* or *T.reesei* origin which showed much dough stickiness (paragraph 1, page 360). Thus it is clear that Maat et al., do not teach away from the use of bacterial xylanase, as Maat et al., have compared a single highly purified recombinant xylanase against the commercial preparations of xylanases that comprise other undesirable enzymes as contaminants and affect the quality of doughs and bakery products. Especially, it would be obvious to a skilled artisan, the teachings of Campbell et al., having isolated a xylanase by recombinant methods and lacking the signal sequence, clearly provides

teaching, motivation and suggestion and it would be "obvious to try" the isolated xylanase in the use of said xylanase in baking and bakery products.

Appellants further argue:

(6) The claimed invention demonstrates unexpected results which are indicia of nonobviousness. The examiner has failed to comment regarding Appellants discovery that the xylanase produced by the polynucleotide sequence of SEQ ID NO: 6 had a surprising and unexpected effect. In particular, the claimed xylanase produced significantly less sticky dough as compared with other xylanases, including other bacterial xylanases. (See Example 1 and Table 1-4 of the specification.) Thus, it was unexpected that the use of bacterial xylanase resulted in dough which was less sticky than other fungal xylanases. Indeed, the fungal and bacterial xylanases had different effects on the stickiness of the dough produced in the specification. *See e.g.* Table 2 of the specification. Additionally, this data also shows that there are differences in stickiness of dough produced by different bacterial xylanases. *See* Table 4 (pages 14-16 of Appeal brief dated 05/27/09).

Reply (6): Examiner in his reply (1)-(5) above has established teaching, motivation, suggestion and it would be "obvious to try" the isolated xylanase of the instant invention and the use of said xylanase in baking and bakery products as the teachings of Campbell et al., Paice et al., and Poutanen teach the use of recombinantly produced xylanase in a cellular context free of other contaminating cellulolytic enzymes. In addition the combined teachings of Campbell et al., and Maat et al., (cited by the Appellants to support their arguments) also provide teaching, motivation and suggestion

and "obvious to try" the specific xylanase of the instant invention from among the various xylanases disclosed in the prior art (494 sequences deposited in NCBI database) as the combined teachings of both Campbell et al., and Maat et al., indicates to a skilled artisan the advantages of using a recombinantly produced enzyme in a suitable cellular context over mixtures of xylanases with other enzymes. Furthermore, it would not be undue experimentation to measure the effect of recombinantly produced xylanases on dough stickiness in a screening method/process as the discussion in Maat et al., suggests that reduction in stickiness is more likely due to having a pure xylanase rather than the source of the xylanase, albeit bacterial or fungal and points to the conclusion that the results of the instant invention are fully expected and with predictable success.

In addition, perusal of Appellants data in Table 2 (page 48) and Table 4 (page 49) of the specification reveals that the Appellants are comparing the performance of recombinantly isolated bacterial xylanase of the instant invention (highly pure preparation) against commercial sources and does not provide any statistical analysis between the results as they have given raw numbers. Appellants have not directly compared the specific activity of instant invention *vs.* the specific activity of other commercial xylanases in their study i.e., comparison of a known concentration of pure enzyme protein with the associated activity to determine the effect of the enzyme on stickiness, such data or any statistical analysis has not been provided and Maat certainly suggests use of highly purified xylanases free from other components. Therefore, examiner takes the position that Appellants are simply asserting that the

results of the instant invention are unexpected and non-obvious without substantiating their assertion with the required data and analysis to make claims such as "The claimed invention demonstrates unexpected results which are indicia of nonobviousness and in particular, the claimed xylanase produced significantly less sticky dough as compared with other xylanases, including other bacterial xylanases". Thus examiner takes the postion that Appellants have failed to establish that the results are in fact unexpected, unobvious, and of statistical and practrical significance (See MPEP 716.02(b). See also *Ex parte Gelles*, 22 USPQ2d 1318 (Bd. Pat. App. & Inter. 1992).

Appellants further argue:

(7) The cited art teaches away form the claimed invention, the examiner relies on Poutanen, discussed *supra* that a specific fungal xylanase from *Aspergillus* caused increase in specific volume of wheat bread without causing stickiness citing Maat. Appellants maintain that Poutanen and Maat teach away from the use of bacterial xylanase in bakery products or doughs for bakery products as required by the claimed invention. specifically Maat states that the use of *Aspergillus awamori* (fungal) xylanase is effective in "increasing the specific volume of breads, without giving rise to negative side effect on dough handling (stickiness of dough) *as can be observed with xylanases derived from other fungal or bacterial sources*" Maat 349 (emphasis added). Appellants maintain that the examiner must consider Maat as 1) the examiner must consider the Poutanen reference as a whole; 2) Maat was cited in Table 3 by Poutanen for the very proposition the examiner is relying upon in his rejection (i.e., "the addition of xylanase was effective in increasing the specific volume of wheat bread without causing

stickiness (Table 3, page 304) (Advisory Action at 3). On considering whether the teaching of Poutanen could be applied to other xylanases, a person of ordinary skill would have sought out further information in the form of reference cited by Poutanen i.e., Maat. Maat is being cited by the Appellants in order to rebut the examiner's interpretation of Poutanen and provide support for Appellants' assertion that Poutanen teaches away from the use of bacterial xylanases (pages 16-18 of Appeal brief).

Reply (7): Examiner has fully considered the teachings of both Poutanen and Maat and continues to hold his position that that Appellants have cited a very "select" portion of Maat, page 349, paragraph 2, to support their argument. Contrary to appellants'arguments, if one looks at Maat in its entirety, the reference emphasizes the use of highly purified recombinant xylanase irrespective of the source; specifically page 350, paragraph 2 recites "The commercial enzyme preparations combine several enzyme activities, and vary considerably in composition and ratio of activities, depending on the source. In order to better control the effect of enzymes with respect to above mentioned process and product criteria we have embarked on the analysis of fungal enzyme preparations. This has eventually resulted in the identification of a xylanase as a very important contributor to improved bread volume and design of a production route of a specific xylanase, involving recombinant DNA procedures".

Therefore, in fact Maat et al., and the cited art Poutanen supports Office position and does not teach away from the use of bacterial xylanase. Maat et al., used specific fungal xylanase in their studies as said organism was a high producer of the desired xylanase as compared to other xylanases (paragraph 1, page 355) and therefore the

interpretation by the Appellants that the reference of Maat et al., teaches away from the use of bacterial xylanase is **not agreed.** In fact, the xylanase isolated by Maat et al., had **considerable homology to bacterial xylanases** (page 357). Maat concludes that "Moreover, the xylanase enzyme described here had a good effect on the crumb structure and gave rise to little or no dough stickiness contrary to preparations of *Trichoderma viridi* or *T.reesei* origin which showed much dough stickiness (paragraph 1, page 360). Thus it is clear that Maat et al., do not teach away from the use of bacterial xylanase, as Maat et al., have compared a single highly purified recombinant xylanase against the commercial preparations of xylanases that comprise other undesirable enzymes as contaminants and affect the quality of doughs and bakery products. Especially, it would be obvious to a skilled artisan, the teachings of Campbell et al., having isolated a xylanase by recombinant methods and lacking the signal sequence, clearly provides teaching, motivation and suggestion and it would be "obvious to try" the isolated xylanase in the use of said xylanase in baking and bakery products.

Appellants further argue:

(8) Claim 67 is not obvious over Haarasilta or Poutanen, Paice, Wolf and Campbell and further in view of Autio. Examiner alleges that Autio teaches "the effects of purified xylanase and glucanase on the structural baking characteristics of doughs, said reference discloses that addition of glucanase had a hardening effect on doughs and bakery products. For the reasons discussed above, Autio does not cure the deficiencies of Harrasilta or Poutanen, Paice, Wolf and Campbell (pages 18-19 of Appeal brief dated 05/27/09).

Reply (8): Examiner in reply (1)-(7) above has established teaching, motivation, suggestion and it would be "obvious to try" the isolated xylanase of the instant invention and the use of said xylanase in baking and bakery products as per combined teachings of Haarasilta or Poutanen, Paice, Wolf and Campbell, as said combination establishes the use of recombinantly produced xylanase in a cellular context free of other contaminating cellulolytic enzymes for improving the baking qualities of doughs and bakery products. In the light of the above, examiner also continues to hold the position "It would have been obvious to a person of ordinary skill in the art to combine the teachings of Harrasilta et al., or Poutanen K, Paice et al., or Wolf et al., Campbell et al., and Autio et al., to adopt the enzymatic reaction conditions for baking products and doughs comprising the xylanase enzyme to be devoid of glucanase as presence of glucanases catalyzes the breakdown of substrates that results in unwanted hardening effect on said products".

In addition, examiner continues to hold the position that examiner has endeavored to base the obviousness rejection based on the following Exemplary rationales that may support a conclusion of obviousness include:

(A) Combining prior art elements according to known methods to yield predictable results;

(B) Simple substitution of one known element for another to obtain predictable results;

(C) Use of known technique to improve similar devices (methods, or products) in the same way;

(D) Applying a known technique to a known device (method, or product) ready for improvement to yield predictable results;

(E) "Obvious to try" – choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;

(F) Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to one of ordinary skill in the art;

(G) Some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

Examiner would like to point out that the rejection clearly articulates based on Graham factual enquires (1) a finding that at the time of the invention, there had been a recognized problem or need in the art, which may include a design need or market pressure to solve a problem; (2) a finding that there had been a finite number of identified, predictable potential solutions to the recognized need or problem; and (3) a finding that one of ordinary skill in the art could have pursued the known potential solutions with a reasonable expectation of success; and therefore there is clear motivation for commercial exploitation. Further, "a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely that product [was] not of innovation but of ordinary skill and common sense. In that instance the fact that a combination was obvious to try might show that it was obvious under § 103." KSR, 550 at U.S. 398 (2007), 82 USPQ2d

at 1397. All the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods **with no change in their respective functions**, and the combination yielded nothing more than predictable results to one of ordinary skill in the art. KSR, 550 U.S. 398 (2007), 82 USPQ2d at 1397; Sakraida v. AG Pro, Inc., 425 U.S. 273, 282, 189 USPQ 449, 453 (1976); Anderson 's-Black Rock, Inc. v. Pavement Salvage Co., 396 U.S. 57, 62-63, 163 USPQ 673, 675 (1969); Great Atlantic & P. Tea Co. v. Supermarket Equipment Corp., 340 U.S. 147, 152, 87 USPQ 303, 306 (1950).

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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